77TH CONGRESS } HOUSE OF REPRESENTATIVES { DOCUMENT
1st Session } { No. 85

MARBLEHEAD HARBOR, MASS.

LETTER

FROM

THE SECRETARY OF WAR

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, UNITED STATES ARMY, DATED NOVEMBER 18, 1940, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND ILLUSTRATIONS, ON A PRELIMINARY EXAMINATION AND SURVEY OF MARBLEHEAD HARBOR, MASS., AUTHORIZED BY THE RIVER AND HARBOR ACT APPROVED JUNE 20, 1938

FEBRUARY 11, 1941.—Referred to the Committee on Rivers and Harbors and ordered to be printed with two illustrations

WAR DEPARTMENT,
Washington, February 11, 1941.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEAR MR. SPEAKER: I am transmitting herewith a report dated November 18, 1940, from the Chief of Engineers, United States Army, on preliminary examination and survey of Marblehead Harbor, Mass., authorized by the River and Harbor Act approved June 20, 1938, together with accompanying papers and illustrations.

The Bureau of the Budget has been consulted and advises that authorization of the project recommended by the Chief of Engineers would not be in accord with the program of the President at this time.

Sincerely yours,

HENRY L. STIMSON,
Secretary of War.

293975—41

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 18, 1940.

Subject: Marblehead Harbor, Mass.
To: The Secretary of War.

1. I submit, for transmission to Congress, my report, with accompanying papers and illustrations, on preliminary examination and survey of Marblehead Harbor, Mass., authorized by the River and Harbor Act approved June 20, 1938.

2. Marblehead Harbor is a small, rectangular cove located in Massachusetts Bay 20 miles northeast of Boston. It is approximately 1½ miles long, one-half mile wide, and has depth ranging up to 25 feet. It is used extensively by yachts and small recreational craft. A smaller cove known as Little Harbor and located on the shore of the mainland at the entrance to the harbor serves as an anchorage ground for local fishing boats. The mean range of tide in the harbor is 9.1 feet. Federal expenditures of $500 and $84 have been made from funds provided by the acts of August 30, 1852, and March 3, 1899, respectively, for repair of a sea wall at the southeasterly end of the harbor.

3. Local interests request the construction of a breakwater 750 feet long extending northeasterly from Marblehead Neck, dredging of an anchorage area of 16 acres on the east side of the harbor to a depth of 20 feet at mean low water, an area of 16 acres on the southwest end of the harbor to 9 feet, and an area of 1.2 acres in Little Harbor to 6 feet. The breakwater is desired for protection from seas from the northeast quadrant which enter the harbor, rendering the outer portion entirely unfit for anchorage and causing damage to vessels in the inner harbor. Increased anchorage is desired to relieve the present congestion caused by the great number of boats now moored in the harbor. Representatives of the town of Marblehead indicated the possibility of a local contribution of from $10,000 to $20,000 toward the cost of the work, and it has been indicated that a contribution to the cost may be expected from the Commonwealth of Massachusetts.

4. The town of Marblehead, lying on the west side of the harbor, has a population of 10,200 and is primarily a residential community. Its principal business activity is catering to the needs of the permanent residents and to a large summer population attracted to the area by yachting and other recreational facilities. An excellent system of highways and a branch line of the Boston & Maine Railroad serve the needs for transportation. The harbor facilities consist of 26 landings, 4 wharves, 7 marine railways, and 6 yacht yards engaged in the repair and storage of boats. The water-borne commerce is limited to several thousand tons of anthracite coal per year, which is received in barges of 15-foot draft and unloaded at one of the wharves for local distribution. Fishing and lobstering is carried on with about 20 boats the value of the catch being estimated at $30,000 to $40,000 per year, Local and transient recreational craft ranging in size from small. sailboats to yachts drawing 16 feet use the harbor, which contains approximately 440 permanent moorings.

5. The district engineer is of the opinion that the anchorages desired in Marblehead Harbor are necessary for the accommodation of local and visiting craft and are justified by the prospective general and local benefits. He finds that the breakwater proposed by local

interests is not feasible because it will provide little protection, and that dredging in Little Harbor will result only in small benefits of local character, which would not warrant Federal participation. He therefore recommends improvement of the harbor by dredging an area of 13 acres on the east side to a depth of 20 feet, and an area of 16 acres at the southwest end of the harbor to a depth of 9 feet, at a total estimated cost of $119,200 for new work and $1,250 annually for maintenance, provided local interests contribute one-half of the initial cost of the project. The division engineer concurs.

6. The Board of Engineers for Rivers and Harbors, after full consideration of the report of the district engineer and of additional matter presented by local interests, concurs with the reporting officer in recommending a project for improvement to provide two anchorages, at a cost of $120,000 for new work and $1,250 annually for maintenance, on the condition that local interests contribute one-half of the initial cost.

7. After due consideration of these reports, I concur in the views and recommendations of the Board. The harbor at Marblehead has long been noted as one of the principal centers of recreational boating. During the summer season small boats come in great numbers from distant points to participate in regattas off Marblehead. The natural harbor has served well, but additional deep water is now required to accommodate the increased traffic. I therefore recommend improvement of Marblehead Harbor, Mass., by providing a depth of 20 feet at mean low water in an area of 13 acres on the east side of the harbor and a depth of 9 feet at mean low water in an area of 16 acres at the southwest end of the harbor, as shown on the accompanying map, at an estimated cost of $120,000 for new work and $1,250 annually for maintenance; provided local interests contribute one-half of the initial cost of the project, but not to exceed $60,000, and agree to hold and save the United States free from all claims for damages that may result from the improvement.

J. L. Schley,
Major General,
Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

[Second endorsement]

The Board of Engineers for Rivers and Harbors,
Washington, D. C., May 27, 1940.

To the Chief of Engineers, United States Army.

1. Local interests were advised of the nature of the division engineer's report and given an opportunity to present additional information to the Board. Careful consideration has been given to the communications received.

2. The Board concurs in general with the reporting officer. The prospective benefits from the requested breakwater and from the anchorage in Little Harbor are insufficient to warrant the expenditures necessary for these improvements. Additional anchorage area is required in the main harbor for the accommodation of local and visiting recreational craft, and it can be provided at reasonable cost. The prospective benefits are considered ample and sufficiently general in character to warrant Federal participation in the cost and construc-

tion. The Board therefore recommends the improvement of Marblehead Harbor, Mass., by providing a depth of 20 feet at mean low water in an area of 13 acres on the east side of the harbor and a depth of 9 feet at mean low water in an area of 16 acres at the southwest end of the harbor, as shown on the accompanying map, at an estimated cost of $120,000 for new work and $1,250 annually for maintenance; provided local interests contribute one-half of the initial cost of the project, but not to exceed $60,000, and agree to hold and save the United States free from all claims for damages that may result from the improvement.

For the Board:

THOMAS M. ROBINS,
Brigadier General, Corps of Engineers,
Senior Member.

SURVEY OF MARBLEHEAD HARBOR, MASS.

SYLLABUS

The district engineer is of the opinion that protection of Marblehead Harbor by means of a breakwater as proposed by local interests is not feasible and that the desired dredging in Little Harbor would result in no benefits to general navigation upon which Federal participation might be justified. He recommends the improvement of Marblehead Harbor, Mass., to provide additional anchorage space in the main harbor by dredging two areas totaling about 29 acres, one to a depth of 9 feet, the other to a depth of 20 feet at mean low water, at an estimated cost of $119,200 for new work and $1,250 annually for maintenance, all as shown in plan B on accompanying map, provided local interests contribute one-half the initial cost of the project and agree to hold and save the United States free from all claims for damages attributable to the execution of the improvement.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Boston, Mass., February 13, 1940.

Subject: Survey of Marblehead Harbor, Mass.
To: The Division Engineer, North Atlantic Division, New York, N. Y.

1. *Authority.*—This report is submitted in compliance with the following authorization contained in section 8 of the River and Harbor Act approved June 20, 1938:

> The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following-named localities * * * Marblehead Harbor, Massachusetts.

As prescribed by law, a preliminary examination was made by the district engineer, and his report, dated March 6, 1939, contained a recommendation for a survey of the locality. The division engineer and the Board of Engineers for Rivers and Harbors concurred in this favorable recommendation, and the survey was authorized by the Chief of Engineers in letter dated April 24, 1939.

2. *Description.*—Marblehead Harbor is a deep and capacious waterway lying on the Massachusetts coast about halfway between Cape Ann and Boston. It lies about 11 nautical miles southwest of Gloucester Harbor, 3 miles southeast of Salem Harbor, 14 miles northeast of Lynn Harbor, and 19 miles northeast of Boston Harbor. The harbor, about 7,500 feet long and 2,000 feet wide, is roughly rectangular in shape, with its longitudinal axis lying in a northeast-southwest direction. The northwesterly shore of the harbor is formed by the portion of the mainland occupied by the town of Marblehead, while

the opposite shore is formed by the offshore body of land known as Marblehead Neck. A causeway connecting Marblehead Neck with the mainland closes the harbor at its southwesterly end, leaving only the northeast end exposed to the sea. Of the total harbor area of approximately 320 acres, depths of 9 feet, 15 feet, and 20 feet at mean low water are available over areas of about 250, 200, and 160 acres, respectively. On the shore of the mainland, northwest of the entrance to the main harbor, there is a small cove, known as Little Harbor, having an area of about 12 acres at low water, which serves as an anchorage ground for some 20 small local fishing vessels. Depths in this locality are 6 feet or greater over an area of about 4 acres.

3. The mean range and spring range of tide in Marblehead Harbor are 9.1 feet and 10.6 feet, respectively. There are no bridges crossing the harbor nor are any questions of water power, shore-line changes, or flood control involved in the improvement under consideration. The report on preliminary examination to which reference is made in paragraph 1 is the only report on Marblehead Harbor submitted within the past 5 years. The locality is shown on United States Coast and Geodetic Survey Chart 240, and on the map (in two sheets) accompanying this report.

4. *Tributary area.*—The town of Marblehead in 1935 had a population of 10,173 and, as of January 1, 1938, had estates valued at $19,782,700. Some 60 years ago the town was the center of a thriving shoe-manufacturing industry; but after two disastrous fires in the latter part of the nineteenth century, the industry gradually disappeared. At the present time, Marblehead is primarily a residential community in which the principal commercial activities are carried on by retail establishments catering to the needs of the permanent residents as well as to the large additional summer population attracted by yachting and other recreational facilities for which the area is famous. Six yacht yards, engaged in the construction, repair, and storage of boats, are located on the water front, and a fishing and lobstering industry of some local importance is carried on. Important industrial centers are located at Beverly, Salem, and Lynn, all within a radius of 6 miles of Marblehead. Each of these 3 cities has its own harbor facilities. The locality under consideration is adequately served by an excellent system of land transportation, including a branch line of the Boston & Maine Railroad, bus lines of the Eastern Massachusetts Street Railway, and a net work of improved highways.

5. *Existing project.*—Under authorization contained in the act of August 30, 1852, the Federal Government expended $500 on repairs to the sea wall on the south side of the narrow beach which connects Marblehead Neck with the mainland, at the southwesterly end of the harbor. The existing project, which was adopted by the act of March 3, 1899, provides for the repair of this sea wall. These repairs were effected in 1903 at a cost of $84. No local cooperation has been prescribed in connection with the existing project for Marblehead Harbor.

6. *Other improvements.*—In 1918 the Commonwealth of Massachusetts dredged an area of about 2.3 acres to a depth of 6 feet at mean low water in the northern part of Little Harbor, northwesterly of Gerry Island, at a cost of $11,166.16. Of this amount, $2,500 was contributed by local interests.

7. *Terminal and transfer facilities.*—Present terminal facilities at Marblehead Harbor consist of 26 landings of the float-and-runway type connected to shore approaches, 3 wharves of the solid-fill type, and 1 wharf of pile and timber construction. Three of the landings, conveniently located on the town side of the harbor, are maintained by the town of Marblehead and are open to the public without charge. Eleven of the landings are semiprivate facilities maintained by the yacht clubs, boat yards, and business places catering to the recreational traffic. The remaining 12 landings are privately owned and are not open to the public. One of the wharves, owned by the J. S. Martin Coal Co., provides depths ranging from 6 or 7 feet at its outer end to zero at its inner end and is used for the receipt and distribution of coal and wood. Coal is received at this wharf in barges carrying about 1,200 tons and drawing approximately 15 feet and is unloaded by means of a small steam derrick. Another of the wharves is owned by the Marblehead Electric Light Co., but at the present time it is not used for water-borne commerce. The third solid-fill wharf, owned by the Eastern Yacht Club, is located on the Marblehead Neck side of the harbor. The pile and timber wharf is owned by the Marblehead Transportation Co., which operates a small ferry between Marblehead Neck and the mainland. A total of 7 marine railways, used by the various boat yards in hauling vessels out of the water, are available.

8. *Improvement desired.*—In order to afford local interests an opportunity to express their views with respect to the improvement of Marblehead Harbor, a public hearing was held at Marblehead on November 16, 1938. A complete record [1] of the hearing was submitted with the district engineer's report [1] on preliminary examination dated March 6, 1939. Among those in attendance at the hearing were the Representative in Congress from the district which includes Marblehead; a representative of the Massachusetts Department of Public Works; the selectmen of the town of Marblehead; representatives of the Corinthian, Eastern, and Boston Yacht Clubs and the Massachusetts Bay Yacht Clubs Association; local businessmen; and private citizens of the community.

9. The improvement most strongly advocated by local interests consists of a stone breakwater about 750 feet long, extending in a north-northeasterly direction from the Northern tip of Marblehead Neck toward black buoy No. 3. Proponents of the improvement stated that storms from the northeast quadrant result in rough seas which approach the harbor entrance from an easterly direction, sweep around the end of Marblehead Neck, and continue into the harbor, creating conditions distinctly unfavorable to safe anchorage. During such storms, it was maintained, the outer portion of the harbor is rendered entirely unfit for anchorage and the inner portion becomes so rough that anchored vessels are frequently torn from their moorings and are subject to severe damage by collision and grounding. Added to its unfavorable anchorage conditions, the harbor is congested, and as a result yachtsmen cruising the waters of the North Atlantic avoid putting in at Marblehead, preferring to seek the more sheltered and more spacious facilities available elsewhere. It has become customary among the owners of yachts which carry permanent crews to leave Marblehead Harbor whenever severe northeast storm conditions are predicted and seek shelter at Manchester or Gloucester.

[1] Not printed.

10. Local interests expressed the belief that the desired breakwater would break up the seas which now enter the harbor, thereby improving the quality of anchorage areas in present use and rendering the rough areas at the outer end of the harbor sufficiently quiet to serve as additional anchorage space. It was pointed out that the most severe northeast storms commonly occur in the spring and fall and that if the harbor were adequately sheltered by breakwater protection, the yachting season could be appreciably lengthened.

11. A number of statements presented at the hearing placed great emphasis on the congested condition of the harbor, which contains some 440 permanent moorings. To relieve this congestion by increasing the anchorage space available for large and small pleasure craft as well as for local fishing boats, the following additional improvements in the harbor were suggested:

(*a*) Dredging to a depth of 20 feet at mean low water an area of approximately 16 acres on the east side of the harbor in the vicinity of Boden Point. This would involve the removal of certain rock-ballast dumps.

(*b*) Dredging to a depth of 9 feet at mean low water an anchorage area of approximately 16 acres at the inner, or southwest, end of the harbor.

(*c*) Dredging to a depth of 6 feet at mean low water an anchorage area of approximately 1.2 acres in the northern part of Little Harbor, west of Gerry Island.

(*d*) Dredging to a depth of 6 feet at mean low water an anchorage area of approximately 1.6 acres in the southern part of Little Harbor southwesterly of Gerry Island.

12. Local interests expressed the opinion that the improved harbor conditions which would result from breakwater protection and increased anchorage space would greatly stimulate yachting activity, not only by attracting visiting craft in greater numbers but also by encouraging more vessels to use Marblehead Harbor as a permanent base. The resulting benefits which are claimed include increased tax revenues and increased income from the sale of supplies and expenditures for repair and storage of boats in local yards.

13. One of those present at the hearing, a long-time resident of Marblehead and former boat owner, presented written and verbal statements expressing determined opposition to the construction of a breakwater. His opposition was based on the belief that such a structure would interfere with the movement of water in and out of the harbor with the rise and fall of the tide, thus tending to aggravate sanitary conditions in the harbor. He expressed the opinion that under present conditions the discharge of raw sewage into the harbor from boats and from land sources already results in pollution which approaches the limit necessary for reasonably satisfactory standards of public health and esthetic beauty. He pointed out that the taking of shellfish from the harbor has been prohibited by the Massachusetts Board of Health on the ground that such shellfish are unfit for human consumption. He stated that boats handled with reasonable skill and provided with adequate moorings do not need the protection which might be afforded by a breakwater, which he characterized as an added hazard to navigation, involving a waste of public funds. Other speakers at the hearing expressed disagreement with these unfavorable views.

14. The only specific offer of local cooperation made at the hearing came from the Board of Selectmen of Marblehead, who expressed willingness to recommend that the town contribute $10,000 to $20,000 toward the cost of the desired improvement. The representative of the Massachusetts Department of Public Works who attended the hearing had no statement to make relative to cooperation by his department. Subsequent information obtained verbally from the department of public works, however, indicates a willingness on the part of this agency to recommend legislative action which would enable the Commonwealth to bear a portion of the cost of a Federal project for the improvement of Marblehead Harbor. Representatives of the yacht clubs indicated that the United States could expect no cash contribution from yachting interests.

15. *Commerce and vessel traffic.*—The J. S. Martin Coal Co. is the only concern located on Marblehead Harbor which receives waterborne freight. This concern received, in barges drawing 15 feet of water, 2,292 and 2,136 tons of anthracite coal in 1937 and 1938, respectively, the only 2 years for which statistics are available. According to a representative of the company who appeared at the hearing, annual receipts of coal in past years averaged as high as 10,000 tons. There is no present indication, however, that commercial traffic in Marblehead Harbor will increase substantially, regardless of whether or not the desired improvements are made. Fishing and lobstering is carried on in a small way, but no detailed statistics covering this type of activity are available. It was stated at the hearing that about 20 boats with permanent quarters at Marblehead are engaged in fishing and lobstering, and the value of the annual catch was estimated at $30,000 to $40,000.

16. Marblehead is widely famed as one of the greatest yachting centers on the Atlantic coast. Local and transient pleasure craft, ranging in size from small sailboats to yachts drawing 16 feet, frequent the harbor, which contains approximately 440 permanent moorings. Clubhouses maintained on the harbor by 3 yacht clubs had an aggregate assessed valuation of $258,400 in 1938. The properties of 2 of these clubs, the Corinthian and the Eastern Yacht Clubs, are located on the Marblehead Neck side of the harbor, while the Boston Yacht Club has facilities on the opposite shore. Extensive use of the harbor is also made by the members of 3 other clubs which have no permanent clubhouses of their own, the Cruising Club of America, the Marblehead Yacht Club, and the Pleon Yacht Club. The Pleon Yacht Club, an organization for boys and girls, has been in existence more than 50 years. No figures have been submitted as to the number of craft owned by members of these 3 clubs. The tabulation which follows indicates the number and size of vessels enrolled in the Eastern, Corinthian, and Boston Yacht Clubs and the number of these craft which are permanently anchored at Marblehead.

Club	Classified enrollment, length on water line		Total number enrolled	Permanent anchorage, length on water line		Total number anchored
	30 feet or over	Under 30 feet		30 feet or over	Under 30 feet	
Eastern Yacht Club	183	98	281	64	70	134
Corinthian Yacht Club	38	59	97	[1] 38	[1] 59	[1] 97
Boston Yacht Club	40	22	[2] 230	40	22	62
Total	261	179	608	142	151	293

[1] Reported as "almost all" having permanent anchorage.
[2] Not all classified.

17. The harbor master at Marblehead estimates that approximately 2,500 transient pleasure craft from all points along the Atlantic seaboard call at Marblehead during the season. About 400 vessels are stored at Marblehead among the 6 local yacht yards, and some 50 of the larger boats, based there during the yachting season, are stored at Boston and other points. Figures introduced at the hearing indicate that the owners of pleasure boats spend approximately $600,000 at Marblehead each year for wages, supplies, equipment, repairs, and storage. The town derives additional revenue from yachting activity in the form of taxes assessed on yacht club property and on yachts which are based at Marblehead.

18. *Difficulties attending navigation.*—The principal difficulties said to attend navigation in Marblehead Harbor are concerned primarily with anchorage conditions. Storms from the northeast quadrant, it is claimed, result in heavy seas which approach from the east, sweep around the tip of Marblehead Neck, and proceed the full length of the harbor. This action, it is said, renders areas near the entrance entirely unfit for anchorage and subjects vessels at anchor farther up the harbor to the danger of tearing loose from their moorings and suffering severe damage by collision or grounding. The lack of sufficient suitable anchorage space in the harbor as well as its roughness are said to discourage boat owners from using the harbor for temporary and permanent anchorage, thus limiting the amount of local income which is derived from catering to the needs of yachtsmen.

19. *Survey.*—In connection with the present study of Marblehead Harbor, a survey of the locality was completed in January 1940. The results of this survey, which included triangulation, topography, soundings, probings, and tidal observations, are indicated on the accompanying map entitled "Marblehead Harbor, Mass.," in two sheets, scale 1 : 2400, file Nos. 106/1–2, F–4–4. A small area at the northeasterly end of the 20-foot anchorage included in plan A would involve the removal of ledge rock. All other material to be dredged in the two plans considered in this report would apparently consist of mud, sand, and gravel.

20. *Plan of improvement.*—Estimates have been prepared for two plans of improvement, designated plan A and plan B. Plan A, which embodies the improvements requested by local interests, consists of the following items:

(*a*) A rubblestone breakwater approximately 750 feet long, extending in a north-northeasterly direction from the northern tip of Marblehead Neck.

(*b*) A dredged anchorage area of approximately 16 acres, 20 feet deep at mean low water, on the east side of the harbor in the vicinity of Boden Point.

(*c*) A dredged anchorage area of approximately 16 acres, 9 feet deep at mean low water, at the inner or southwest end of the harbor.

(*d*) A dredged anchorage area of approximately 1.2 acres, 6 feet deep at mean low water, in the northern part of Little Harbor, west of Gerry Island.

(*e*) A dredged anchorage area of approximately 1.6 acres, 6 feet deep at mean low water, in the southern part of Little Harbor, southwest of Gerry Island.

21. Plan B, which is indicated on the accompanying map as the recommended plan of improvement, consists of items (*b*) and (*c*) above, with the northeasterly portion of the 20-foot anchorage eliminated to avoid the removal of ledge involved in plan A.

22. In the estimates given below for dredging and ledge removal, the quantities are based on place measurement and overdepth allowances of 2 feet in ledge and 1 foot in material other than ledge. All unit prices include an allowance for engineering and contingencies. For purposes of this estimate, it has been assumed that all dredging work would be performed by means of dipper or bucket dredges, with the excavated material deposited at sea. It is possible that the anchorage areas might be dredged by hydraulic equipment if, for example, local interests constructed a suitable bulkhead, as suggested at the hearing, back of which the excavated material could be deposited. Estimated quantities and costs involved in the two plans of improvement are as follows:

Plan A:		
(*a*) Breakwater (97,000 short tons, stone, at $3.50)		$339,500
(*b*) 20-foot anchorage basin:		
Ledge rock (7,900 cubic yards, at $20)		158,000
Material other than ledge (179,000 cubic yards, at 45 cents)		80,600
(*c*) Dredging 9-foot anchorage area at southwest end of harbor (94,000 cubic yards, at 45 cents)		42,300
(*d*) Dredging 6-foot anchorage area in northern part of Little Harbor (20,000 cubic yards, at 45 cents)		9,000
(*e*) Dredging 6-foot anchorage area in southern part of Little Harbor (9,000 cubic yards, at 45 cents)		4,000
Total cost of plan A		633,400
Estimated annual maintenance cost, plan A		2,250
Plan B:		
(*a*) Dredging 20-foot anchorage area	171,000 cubic yards	
(*b*) Dredging 9-foot anchorage area at southwest end of harbor	94,000 cubic yards	
Total dredging (265,000 cubic yards, at 45 cents)		119,200
Total estimated cost of plan B		119,200
Estimated annual maintenance cost, plan B		1,250

23. *Analysis of economic justification.*—The economic cost of plan B, computed as an annual carrying charge, and based on an assumed life of the improvement of 40 years, is given below.

(*a*) Federal investment:		
(1) Estimated cost of improvement		$119,200
Less contribution by local interests		59,600
(2) Total Federal investment		59,600

(*b*) Federal annual carrying charge:	
(1) Interest, at 3½ percent on item (*a*) (2)	2,086
(2) Amortization of item (*a*) (2) (40 years, at 3½ percent)	705
(3) Estimated annual maintenance	1,250
(4) Total annual Federal carrying charge	4,041
(*c*) Non-Federal investment:	
(1) Funds to be contributed	59,600
(2) Total non-Federal investment	59,600
(*d*) Non-Federal annual carrying charge:	
(1) Interest at 4½ percent on item (*c*) (2)	2,682
(2) Amortization of item (*c*) (2) (40 years, at 4½ percent)	557
(3) Total non-Federal annual carrying charge	3,239
(*e*) Total annual carrying charge:	
(1) Federal annual carrying charge	4,041
(2) Non-Federal annual carrying charge	3,239
(3) Total estimated annual carrying charge	7,280

24. The benefits which may be expected to result from the improvement of Marblehead Harbor by the adoption of plan B would accrue primarily to pleasure-boating interests and to those whose incomes are derived in whole or in part from activities based on the yachting industry. Some of these benefits, however, would be of a general nature and would justify some degree of Federal participation in the improvement. Since Marblehead Harbor is recognized as one of the greatest yachting centers in the world, enlargement and improvement of its facilities cannot fail to stimulate interest in yachting and to result in a general increase in the recreational benefits associated with this form of activity. From this point of view, the improvement would not only affect local yachtsmen, but also the owners of the hundreds of pleasure craft, based at all points along the Atlantic coast, which habitually utilize the harbor during periods of varying length during the yachting season. The annual benefits of this character, it is believed, would be sufficiently important to justify the annual Federal carrying charge indicated above.

25. Less general but more tangible benefits may be expected to result locally if the harbor is improved. As pointed out by local interests at the public hearing, expansion of anchorage facilities in the harbor will encourage its use by an increased number of permanent and transient craft, thus resulting in increased local expenditures for supplies, repairs, storage, crew wages, and taxes. Perhaps the most practical measure of the value of such local benefits will be the attitude of local interests toward furnishing a substantial contribution to the cost of the improvement.

26. *Discussion.*—Marblehead Harbor is recognized as one of the most important yachting centers in America. With 440 moorings available for yachts permanently based in the harbor, the excellent facilities for boat repairs and storage afforded by 6 local yacht yards, and the privately owned clubhouse facilities of 3 of the larger yacht clubs, the harbor attracts some 2,500 visiting craft each year. Marblehead Harbor is the center of yacht-racing activity in the North Atlantic, as many as 400 vessels racing from that point in a single day. Whatever its disadvantages may be, it is a self-evident fact that they

have not been serious enough to prevent Marblehead from attaining an outstanding position as a gathering place for yachting enthusiasts.

27. Local interests are primarily interested in improving the harbor to provide smoother, more sheltered conditions for vessels at anchor. They hope to accomplish this objective by the construction of a breakwater some 750 feet long, extending in a north-northeasterly direction from the northern tip of Marblehead Neck. In addition to this, they have suggested that certain areas in the harbor be dredged to provide additional anchorage space, thus relieving the present congestion in the harbor.

28. Rough conditions in Marblehead Harbor, according to local interests, result primarily from storms originating in the northeast quadrant. The seas which result from such storms, it is claimed, approach the harbor from the east, sweep around the end of Marblehead Neck, and affect the surface of the harbor throughout its full length. The breakwater suggested by local interests would, in effect, increase the length of Marblehead Neck by about 750 feet, but would not materially constrict the existing wide harbor entrance, which is exposed to northeasterly storms. Proponents of the breakwater improvement expressed definite opposition to a breakwater projecting in a northwesterly direction, as such a structure, they believe, would constitute an undesirable obstruction to vessels negotiating the entrance.

29. The coast line extending northeasterly from Beverly to Manchester and Gloucester affords some protection to Marblehead with respect to storms from the north to northeast, the effective fetch during such storms ranging from 2 to 4 miles. Even such comparatively short fetches, however, if acted upon by sustained wind movement of high velocity, could produce waves of appreciable magnitude against which a breakwater in a north-northeasterly direction would have no substantial effect. Storms approaching the harbor entrance from a northeasterly to easterly direction have an unlimited sweep from the open sea. Protection against the seas which set in from the east as a result of these storms, as well as against the strong ground swell which persists after violent disturbances at sea, constitutes the principal objective of the proponents of the breakwater project. Since the breakwater as proposed would merely increase the length of Marblehead Neck by about 10 percent without constricting the harbor entrance, the action of the seas at the end of the breakwater would apparently be analogous to the existing movement around the tip of Marblehead Neck. The seas from the east might reasonably be expected to have as great a tendency to sweep around the end of the breakwater and run the entire length of the harbor as they do at present.

30. The desired structure might be expected to provide a small area of comparatively quiet water in the vicinity of the root of the breakwater and afford some shelter to a strip having a width about equal to the length of the breakwater and extending across the mouth of the harbor. This strip, however, would apparently be no more suitable for anchorage purposes than the present outer portion of the harbor, which is afforded equivalent protection by the outer end of Marblehead Neck, but which is, according to local interests, unsatisfactory for anchorage purposes. The greatest benefit which can reasonably be expected to result from the desired breakwater, it is believed, would

consist of a slightly increased degree of shelter in the outer half of the present harbor, with no appreciable effect on the inner half.

31. The roughness of Marblehead Harbor during storms from the northeast quadrant is, of course, basically due to its full exposure to the sea in that direction, and it is believed that this condition cannot be alleviated by any short structure which leaves the harbor entrance entirely open. A breakwater extending north or north-northeast, but substantially longer than that proposed by local interests, or one extending generally northwest and partly closing the entrance, might afford substantial shelter within the harbor. Either of these alternatives, however, would be extremely expensive and the latter type particularly is opposed by local interests who wish to maintain the full width of the entrance to facilitate navigation.

32. It has become common practice, according to statements made at the public hearing, for many of the larger yachts anchored at Marblehead to seek the shelter afforded at Manchester or Gloucester whenever a severe easterly or northeasterly storm is predicted. The preference of yachtsmen for these two harbors during easterly storms is a striking illustration of the advantage afforded by complete natural protection from the northeast—the only quarter to which Marblehead is fully exposed.

33. The breakwater at the entrance to Gloucester Harbor, which was cited at the public hearing as typical of the protection desired at Marblehead, definitely narrows the entrance, decreasing the exposed opening by about 40 percent. A wave front advancing directly into such a protected entrance will be partially dissipated on the breakwater leaving the remainder of the wave to enter the harbor where it will tend to expand to the full width of the harbor after passing the breakwater, and diminish in height.

34. The breakwater proposed by local interests at Marblehead would have no appreciable effect, it is believed, on pollution conditions in the harbor. The desired structure would create no extensive areas of slack water in which sludge might collect nor would it result in any substantial changes in the velocity of tidal currents. The volume of water entering and leaving the harbor with the rise and fall of tide would likewise be unchanged.

35. In view of the above, it is believed that while the objectives upon which the desire for breakwater protection are based are entirely reasonable, there is little likelihood that they would be attained by the structure proposed by local interests. While a more extensive structure, with somewhat different alinement, might afford the desired protection to the harbor, its construction would be extremely costly and would involve features which local interests consider objectionable from the point of view of pleasure-boat navigation. It is believed, therefore, that the construction of a breakwater as desired by local interests to protect Marblehead Harbor is not feasible.

36. The other improvements desired by local interests consist of dredging in two areas in the main harbor and in two small areas in Little Harbor. Use of Little Harbor, where some improvement has been made in the past by the Commonwealth of Massachusetts in cooperation with local interests, is confined principally to a local fleet of about 20 fishing vessels. While dredging in this area would provide additional anchorage space for these vessels, there is apparently no prospective increase in commercial navigation to be expected as a

result of the desired improvement. Dredging in this area, therefore, appears to be largely a matter for local interests to undertake when such action is considered warranted.

37. The request for dredging in the main harbor is based on the desire to relieve the present congested conditions in the harbor by providing additional anchorage areas for small craft as well as for vessels of deep draft. Marblehead is acknowledged to be one of the most important centers of yachting activity on the Atlantic coast, and hundreds of vessels visit the locality each year, using its harbor facilities and participating in the racing events for which it is nationally known. The benefits to be expected from improvement of the facilities of this resort are, therefore, not entirely local but include social and recreational values of wide geographical distribution. Expansion of the facilities of any yachting center as outstanding and widely used as Marblehead is almost certain to carry with it the general benefits creditable to increased interest and participation in a healthful form of recreational activity. While these benefits are not susceptible to definite evaluation in monetary terms, they are believed to be of sufficient importance to justify participation by the Federal Government to the extent of one-half the cost of the improvements.

38. The 20-foot anchorage area included in the recommended improvement excludes a small portion of the northeasterly end of the area suggested by local interests, in order to avoid the necessity for removing ledge rock. While inclusion of this small area would add less than 3 acres to the 20-foot anchorage area, it would more than double the cost of the improvement and has therefore been omitted from the proposed work on the grounds of excessive cost.

39. Improved facilities for anchorage in Marblehead Harbor, according to local interests, will attract visiting craft in increasing numbers and will encourage more boat owners to use Marblehead as a permanent base. As a result, the income of the town and many of its citizens will be augmented through increased taxes and additional expenditures for supplies, repairs, storage, and crew wages. Not even the most enthusiastic proponents claim that the expected increase in the use of the harbor will be made by new vessels built and operated solely because an improved harbor has been provided. Any increase in the number of boats utilizing an improved Marblehead Harbor will come largely from existing vessels which are now based in other harbors along the Atlantic coast and pay taxes to other towns. These vessels are supplied, repaired, stored, and manned at various points along the coast other than Marblehead. Should the proposed improvement encourage a large number of these vessels to make increased use of Marblehead Harbor as a temporary or permanent base, the resulting monetary benefits to Marblehead would be obtained largely at the expense of other harbors along the coast. This phase of the yachting industry, it is believed, is largely a matter of local competition in which apportionment of the business normally available is bound to vary with the natural advantages possessed by competing areas and the initiative and energy displayed by the individual community in seeking its share of trade.

40. As indicated in paragraph 37, the general benefits which may be expected from the improvements embodied in plan B are considered sufficiently important to warrant a contribution of Federal funds

equivalent to one-half the initial cost of the project. In view of the relatively large proportion of total benefits which will be enjoyed locally, the remainder of the cost, it is believed, should be borne by local interests.

41. *Conclusions.*—The district engineer is of the opinion that protection of Marblehead Harbor by means of the breakwater proposed by local interests is not feasible. Dredging in Little Harbor, it is believed, could be expected to result only in small benefits of local character, and hence would not warrant Federal participation. Improvement of the main harbor to provide additional anchorage areas would result in substantial general benefits in addition to those of local nature, and the adoption of such improvement as a Federal project would appear to be justified, provided local interests bear one-half the first cost of the work involved.

42. *Recommendation.*—The district engineer recommends the improvement of Marblehead Harbor, Mass., to provide increased anchorage space by dredging to a depth of 20 feet at mean low water, an area of about 13 acres on the east side of the harbor, and by dredging to a depth of 9 feet at mean low water, an area of about 16 acres at the southwest end of the harbor, as shown in plan B on the accompanying map, at an estimated cost of $119,200 for new work and $1,250 annually for maintenance; provided local interests contribute one-half the initial cost of the project and agree to hold and save the United States free from all claims for damages attributable to the execution of the improvement.

43. The work should be prosecuted at a rate sufficient to insure its completion within 1 year, and the necessary funds should be provided in a single appropriation.

A. K. B. Lyman,
Colonel, Corps of Engineers,
District Engineer.

[First endorsement]

Office of the Division Engineer,
North Atlantic Division,
New York, N. Y., February 19, 1940.

To the Chief of Engineers, United States Army.

I concur in the views and recommendations of the district engineer.

C. L. Hall,
Colonel, Corps of Engineers,
Acting Division Engineer.

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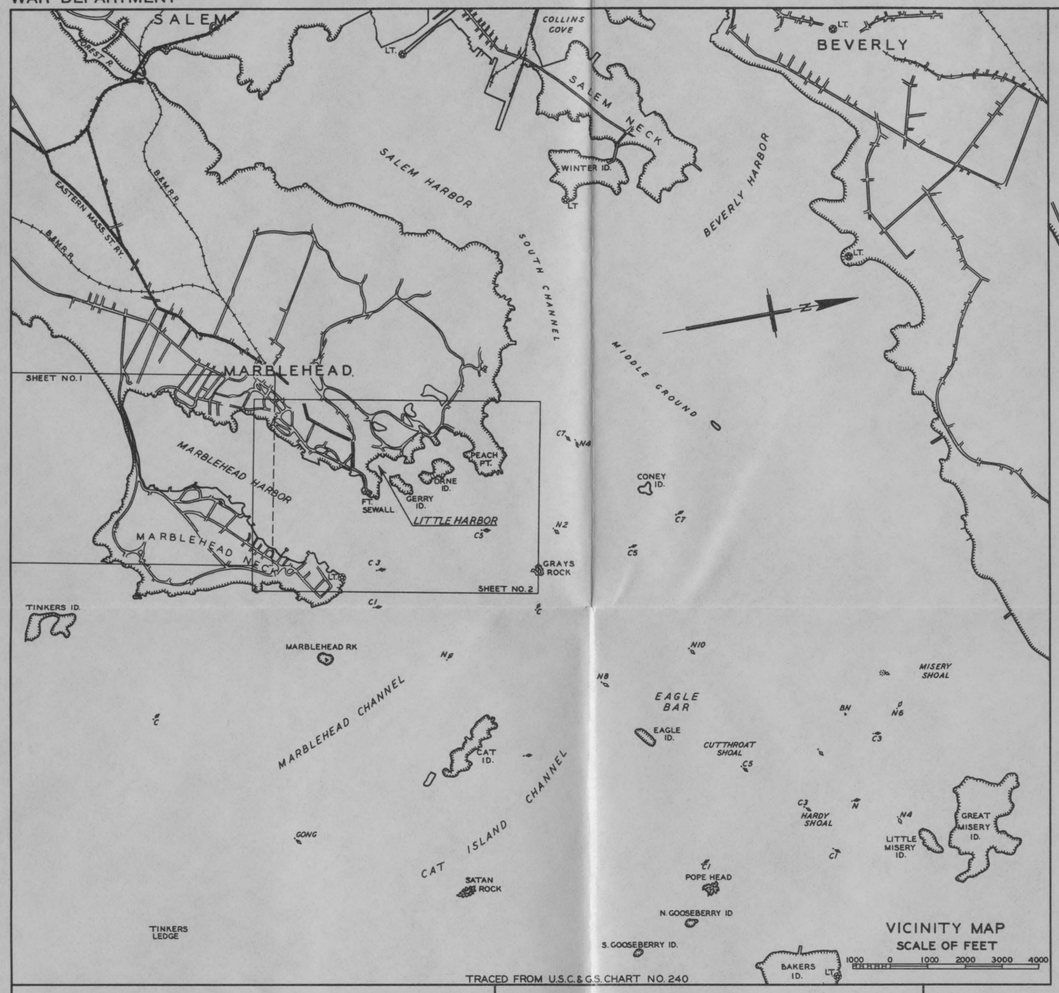
WAR DEPARTMENT

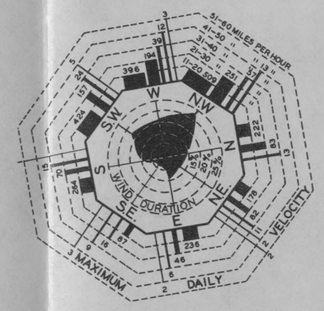
CORPS OF ENGINEERS, U. S. ARMY

MARBLEHEAD



TRACED FROM U.S.C.&G.S. CHART NO. 240

WIND DIAGRAM FOR BOSTON HARBOR, MASS. 1927–1937

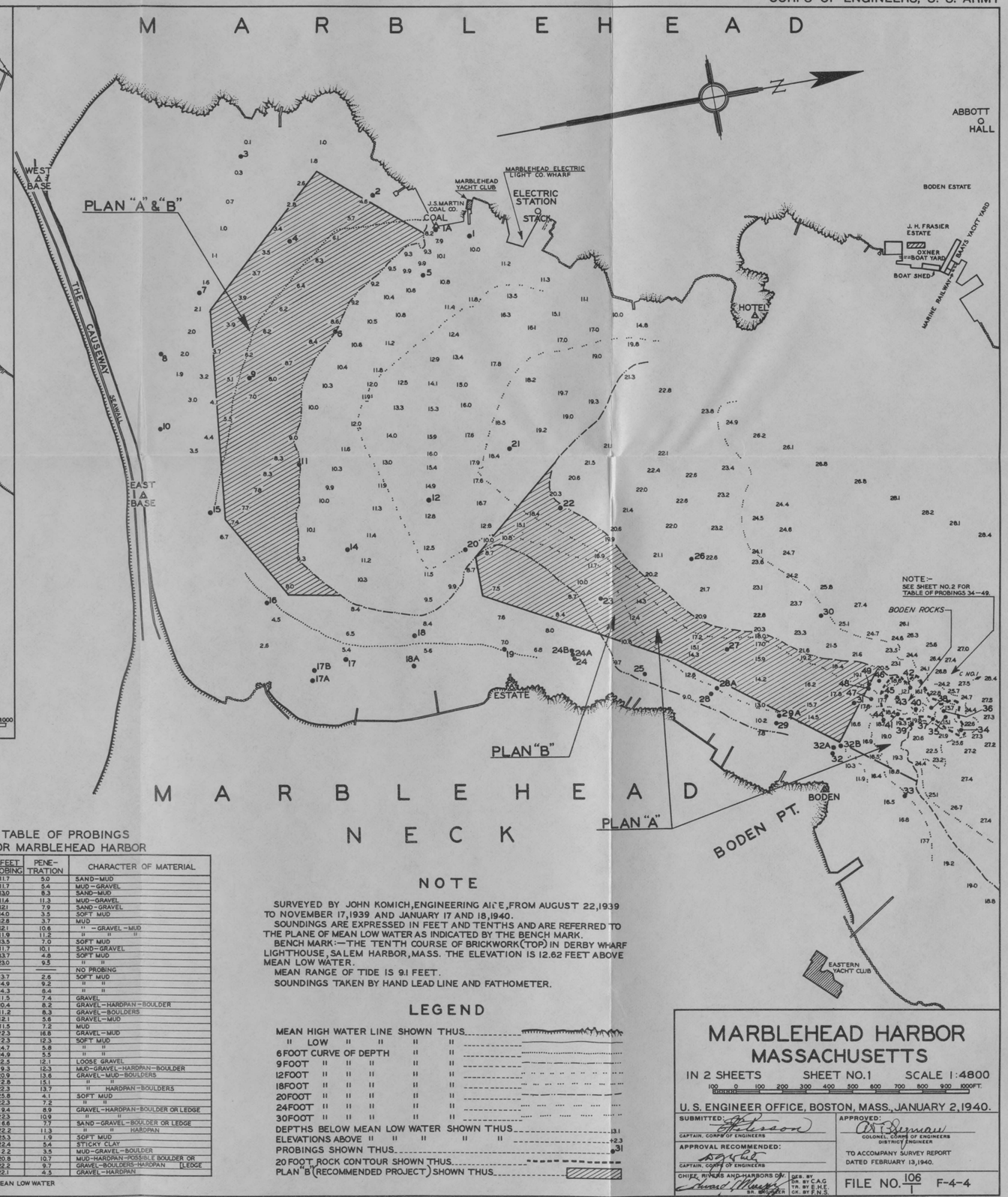


DATA FROM OBSERVATIONS BY THE U.S. WEATHER BUREAU STATION AT BOSTON, MASS.

TABLE OF PROBINGS FOR MARBLEHEAD HARBOR

NO. OF PROBING	* DEPTH IN FEET WATER	PROBING	PENETRATION	CHARACTER OF MATERIAL
1	6.7	11.7	5.0	SAND–MUD
1A	6.3	11.7	5.4	MUD–GRAVEL
2	4.7	13.0	8.3	SAND–MUD
3	0.1	11.4	11.3	MUD–GRAVEL
4	4.2	12.1	7.9	SAND–GRAVEL
5	10.5	14.0	3.5	SOFT MUD
6	9.1	12.8	3.7	MUD
7	1.5	12.1	10.6	" –GRAVEL–MUD
8	0.7	11.9	11.2	" " "
9	6.5	13.5	7.0	SOFT MUD
10	1.6	11.7	10.1	SAND–GRAVEL
11	8.9	13.7	4.8	SOFT MUD
12	13.5	23.0	9.5	" "
13	——	——	——	NO PROBING
14	11.1	13.7	2.6	SOFT MUD
15	5.7	14.9	9.2	" "
16	5.9	14.3	8.4	" "
17	4.1	11.5	7.4	GRAVEL
17A	2.2	10.4	8.2	GRAVEL–HARDPAN–BOULDER
17B	2.9	11.2	8.3	GRAVEL–BOULDERS
18	6.5	12.1	5.6	GRAVEL–MUD
18A	4.3	11.5	7.2	MUD
19	5.5	22.3	16.8	GRAVEL–MUD
20	10.0	22.3	12.3	SOFT MUD
21	18.9	24.7	5.8	" "
22	19.4	24.9	5.5	" "
23	10.4	22.5	12.1	LOOSE GRAVEL
24	7.0	19.3	12.3	MUD–GRAVEL–HARDPAN–BOULDER
24A	7.3	20.9	13.6	GRAVEL–MUD–BOULDERS
24B	7.7	22.8	15.1	" "
25	8.6	22.3	13.7	" HARDPAN–BOULDERS
26	21.7	25.8	4.1	SOFT MUD
27	15.1	22.3	7.2	" "
28	10.5	19.4	8.9	GRAVEL–HARDPAN–BOULDER OR LEDGE
28A	11.4	22.3	10.9	" "
29	8.9	16.6	7.7	SAND–GRAVEL–BOULDER OR LEDGE
29A	10.9	22.2	11.3	" " HARDPAN
30	23.4	25.3	1.9	SOFT MUD
31	17.0	22.4	5.4	STICKY CLAY
32	8.7	12.2	3.5	MUD–GRAVEL–BOULDER
32A	10.1	20.8	10.7	MUD–HARDPAN–POSSIBLE BOULDER OR
32B	12.5	22.2	9.7	GRAVEL–BOULDERS–HARDPAN LEDGE
33	17.6	22.1	4.5	GRAVEL–HARDPAN

*DEPTHS REFER TO MEAN LOW WATER



MARBLEHEAD NECK

NOTE

SURVEYED BY JOHN KOMICH, ENGINEERING AIDE, FROM AUGUST 22, 1939 TO NOVEMBER 17, 1939 AND JANUARY 17 AND 18, 1940.

SOUNDINGS ARE EXPRESSED IN FEET AND TENTHS AND ARE REFERRED TO THE PLANE OF MEAN LOW WATER AS INDICATED BY THE BENCH MARK.

BENCH MARK:– THE TENTH COURSE OF BRICKWORK (TOP) IN DERBY WHARF LIGHTHOUSE, SALEM HARBOR, MASS. THE ELEVATION IS 12.62 FEET ABOVE MEAN LOW WATER.

MEAN RANGE OF TIDE IS 9.1 FEET.

SOUNDINGS TAKEN BY HAND LEAD LINE AND FATHOMETER.

LEGEND

MEAN HIGH WATER LINE SHOWN THUS

" LOW " " " "

6 FOOT CURVE OF DEPTH " "

9 FOOT " " " " "

12 FOOT " " " " "

18 FOOT " " " " "

20 FOOT " " " " "

24 FOOT " " " " "

30 FOOT " " " " "

DEPTHS BELOW MEAN LOW WATER SHOWN THUS 13.1

ELEVATIONS ABOVE " " " " " ..... +2.3

PROBINGS SHOWN THUS 31

20 FOOT ROCK CONTOUR SHOWN THUS

PLAN "B" (RECOMMENDED PROJECT) SHOWN THUS

MARBLEHEAD HARBOR MASSACHUSETTS

IN 2 SHEETS SHEET NO. 1 SCALE 1:4800

100 0 100 200 300 400 500 600 700 800 900 1000 FT.

U. S. ENGINEER OFFICE, BOSTON, MASS., JANUARY 2, 1940.

SUBMITTED: [signature] CAPTAIN, CORPS OF ENGINEERS

APPROVAL RECOMMENDED: [signature] CAPTAIN, CORPS OF ENGINEERS

CHIEF, RIVERS AND HARBORS DIV. [signature] SR. DRAFTSMAN

DES. BY DR. BY C.A.G. TR. BY E.H.E. CK. BY F.N.S.

APPROVED: [signature] COLONEL, CORPS OF ENGINEERS DISTRICT ENGINEER

TO ACCOMPANY SURVEY REPORT DATED FEBRUARY 13, 1940.

FILE NO. 106/1 F-4-4

HOUSE DOC. NO. 85, 77TH CONG., 1ST SESSION

U. S. GOVERNMENT PRINTING OFFICE: 1941—O-293975

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

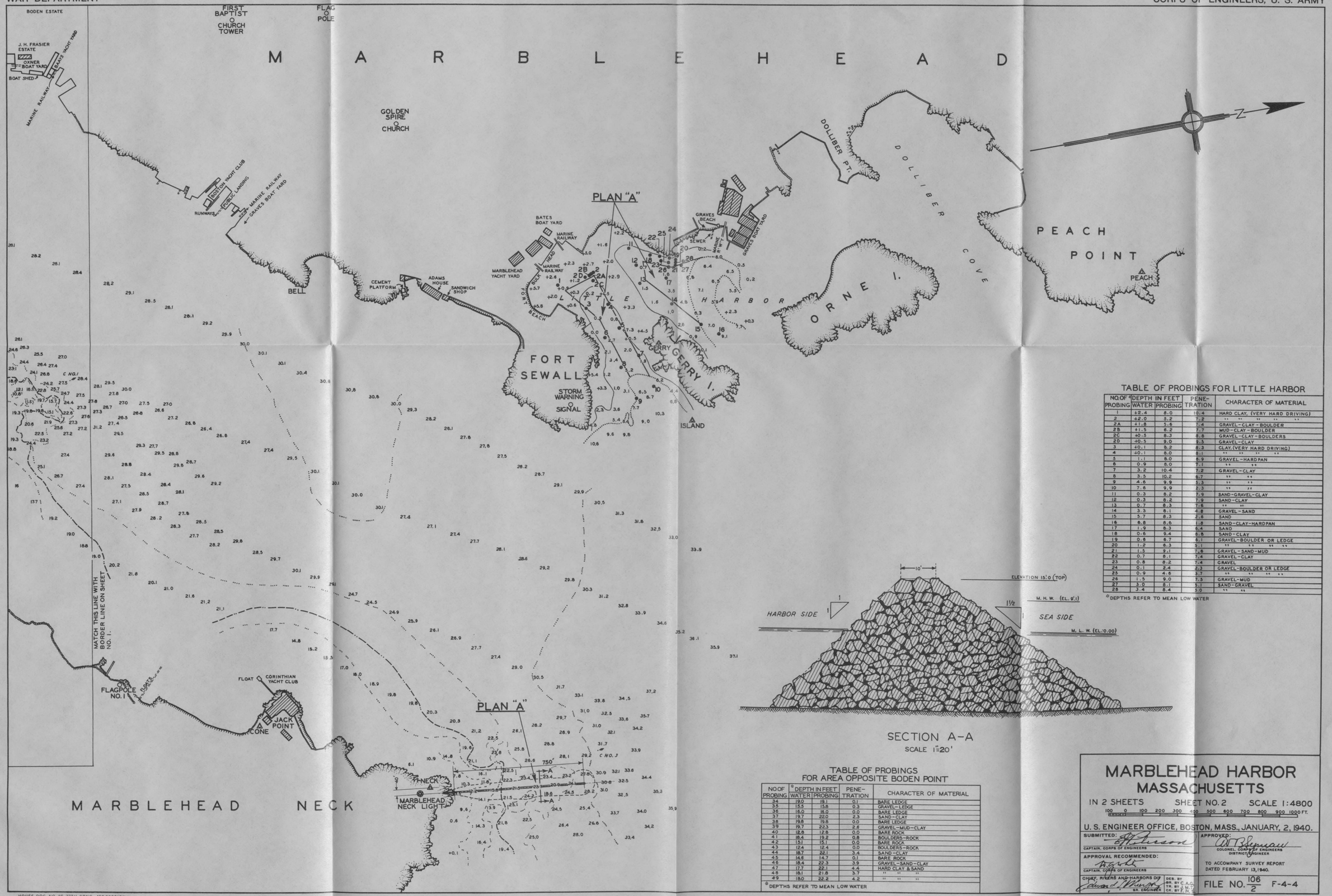


TABLE OF PROBINGS FOR LITTLE HARBOR

NO. OF PROBING	DEPTH IN FEET WATER	DEPTH IN FEET PROBING	PENETRATION	CHARACTER OF MATERIAL
1	+2.4	8.0	10.4	HARD CLAY, (VERY HARD DRIVING)
2	+2.0	5.2	7.2	" " " " "
2A	+1.8	5.6	7.4	GRAVEL-CLAY-BOULDER
2B	+1.5	6.2	7.7	MUD-CLAY-BOULDER
2C	+0.5	8.3	8.8	GRAVEL-CLAY-BOULDERS
2D	+0.5	9.0	9.5	GRAVEL-CLAY
3	+0.1	9.2	9.3	CLAY, (VERY HARD DRIVING)
4	-0.1	8.0	8.1	" " " "
5	1.1	8.0	8.9	GRAVEL-HARD PAN
6	0.9	8.0	7.1	" " " "
7	3.2	10.4	7.2	GRAVEL-CLAY
8	3.5	10.2	6.7	" "
9	4.6	9.9	5.3	" "
10	7.6	9.9	2.3	" "
11	0.3	8.2	7.9	SAND-GRAVEL-CLAY
12	0.3	8.2	7.9	SAND-CLAY
13	0.7	8.3	7.6	" "
14	3.3	8.1	4.8	GRAVEL-SAND
15	5.7	8.3	2.6	SAND
16	6.8	8.6	1.8	SAND-CLAY-HARDPAN
17	1.9	8.3	6.4	SAND
18	0.6	9.4	8.8	SAND-CLAY
19	0.8	8.7	8.1	GRAVEL-BOULDER OR LEDGE
20	1.2	8.3	5.1	" " " "
21	1.5	9.1	7.6	GRAVEL-SAND-MUD
22	0.7	8.1	7.4	GRAVEL-CLAY
23	0.8	8.2	7.4	GRAVEL
24	0.1	2.4	2.3	GRAVEL-BOULDER OR LEDGE
25	0.9	4.6	3.7	" " " "
26	1.5	9.0	7.5	GRAVEL-MUD
27	3.0	8.1	5.1	SAND-GRAVEL
28	3.4	8.4	5.0	" "

*DEPTHS REFER TO MEAN LOW WATER

SECTION A-A

SCALE 1"=20'

TABLE OF PROBINGS FOR AREA OPPOSITE BODEN POINT

NO OF PROBING	*DEPTH IN FEET WATER	DEPTH IN FEET PROBING	PENETRATION	CHARACTER OF MATERIAL
34	19.0	19.1	0.1	BARE LEDGE
35	15.5	15.8	0.3	GRAVEL-LEDGE
36	16.0	16.0	0.0	BARE LEDGE
37	19.7	22.0	2.3	SAND-CLAY
38	19.8	19.8	0.0	BARE LEDGE
39	19.7	22.3	2.6	GRAVEL-MUD-CLAY
40	12.8	12.8	0.0	BARE ROCK
41	18.4	19.2	0.8	BOULDERS-ROCK
42	15.1	15.1	0.0	BARE ROCK
43	12.4	12.4	0.0	BOULDERS-ROCK
44	18.7	22.1	3.4	SAND-CLAY
45	14.6	14.7	0.1	BARE ROCK
46	18.4	22.3	3.9	GRAVEL-SAND-CLAY
47	17.7	22.1	4.4	HARD CLAY & SAND
48	18.1	21.8	3.7	" " "
49	18.0	22.2	4.2	" " "

*DEPTHS REFER TO MEAN LOW WATER

MARBLEHEAD HARBOR
MASSACHUSETTS

IN 2 SHEETS SHEET NO. 2 SCALE 1:4800

100 0 100 200 300 400 500 600 700 800 900 1000 FT.

U. S. ENGINEER OFFICE, BOSTON, MASS., JANUARY, 2, 1940.

SUBMITTED: C. H. Peterson
CAPTAIN, CORPS OF ENGINEERS

APPROVED: A. T. Seyman
COLONEL, CORPS OF ENGINEERS
DISTRICT ENGINEER

APPROVAL RECOMMENDED: A. G. L.
CAPTAIN, CORPS OF ENGINEERS

TO ACCOMPANY SURVEY REPORT DATED FEBRUARY 13, 1940.

CHIEF, RIVERS AND HARBORS DIV. Edward L. Burpee
SR. ENGINEER

DES. BY
DR. BY C.A.G.
TR. BY J.M.P.
CK. BY J.N.S.

FILE NO. 106/2 F-4-4

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